

# APPENDIX E: CONCERN RESPONSE REPORT

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ARCHAEOLOGY – SHIPWRECKS – ADDITIONAL RESOURCES  
ARCHAEOLOGY – SHIPWRECKS – COASTAL PROCESSES  
PLAN – CULTURAL RESOURCES  
PLAN – CULTURAL RESOURCES – ADDITIONAL DOCUMENT REVIEW  
PLAN – CULTURAL RESOURCES – THANK YOU  
BEACH NOURISHMENT – GENERAL– AQUATIC FAUNA  
BEACH NOURISHMENT – GENERAL– CLIMATE  
BEACH NOURISHMENT – GENERAL– FREQUENCY  
BEACH NOURISHMENT – GENERAL– SAND  
BEACH NOURISHMENT – MT. BALDY – SAND  
BEACH NOURISHMENT – PORTAGE LAKEFRONT – OTHER  
COBBLE BERM – COST, ENGINEERING, AND SHORELINE DYNAMICS  
COBBLE BERM – HABITAT – CLAY VALLEY [NEW]  
COBBLE BERM – HABITAT – INVASIVES  
COBBLE BERM – NAVIGATIONAL / RECREATIONAL HAZARD  
COBBLE BERM – COBBLE – PHYSICAL MAKE-UP, INTEGRATION, AND MOVEMENT  
ALTERNATIVE DEVELOPMENT PROCESS  
CHOOSING BY ADVANTAGES PROCESS FOR SELECTION OF THE PREFERRED ALTERNATIVES  
DEVELOPMENT OF COSTS  
REQUIREMENT FOR FURTHER STUDIES  
REACHES 1 AND 2 NEW ALTERNATIVE PROPOSED AND REACHES 3 AND 4 NEW ALTERNATIVE PROPOSED  
REACHES 1 AND 2 NEW MITIGATION PROPOSED AND REACHES 3 AND 5 NEW MITIGATION PROPOSED  
ALTERNATIVES ELIMINATED: HARDENED STRUCTURES  
DESCRIPTION OF NO ACTION ALTERNATIVE  
PROPOSED MODIFICATION TO REACHES 1 AND 2 PREFERRED ALTERNATIVE  
REACHES 1 AND 2 PREFERRED ALTERNATIVE GENERAL QUESTIONS  
PROPOSED MODIFICATION TO REACHES 3 AND 4 PREFERRED ALTERNATIVE  
CONSULTATION AND COORDINATION – GENERAL COMMENTS

IMPACT ANALYSIS: GENERAL METHODOLOGY FOR ESTABLISHING IMPACTS / EFFECTS

IMPACT TOPICS DISMISSED FOR DETAILED ANALYSIS: WATER QUALITY

ISSUES: CLIMATE CHANGE

PLAN IMPLEMENTATION AND SIGNAL OF FUTURE INTENT: REMOVAL OF HARDENED STRUCTURE

PURPOSE AND NEED IS NOT VALID OR SUBSTANTIATED

COST OF IMPLEMENTING THE PROJECT IS PROHIBITIVE

COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LAW

PARK LEGISLATION / AUTHORITY

PARK OPERATIONS: EFFECTS OF PROPOSAL AND ALTERNATIVES

THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN: IMPACT OF PROPOSAL AND ALTERNATIVES

TERRESTRIAL HABITAT: IMPACT OF PROPOSAL AND ALTERNATIVES

TERRESTRIAL MANAGEMENT PROPOSED ACTIONS

## **CONCERN RESPONSE REPORT**

The Shoreline Restoration and Management Plan/Draft Environmental Impact Statement (EIS) was made available for public review and comment during a 60-day period ending September 13, 2012. A total of 99 correspondence were submitted.

Substantive comments on the EIS focused on several topics, including issue with varying associated impacts to the environment, private lands, as well as others. The largest numbers of comments were related to the cobble berm associated with draft alternative E and its potential impacts to the shoreline, recreation, and private properties. A summary of the public comments received and the park responses to those comments are provided below.

### **ARCHAEOLOGY – SHIPWRECKS – ADDITIONAL RESOURCES**

#### **Concern Statement:**

The EIS does not address all of the submerged cultural resources within the project's Area of Potential Effect (APE). The resources include shipwrecks that have been researched and mapped by the Indiana Coastal Management Program. The existence of these shipwrecks was mentioned at initial scoping meetings for the Shoreline Management Plan, and we would like to see acknowledgement of these cultural resources included in the Final EIS. Some new research is available now on these resources but was not referenced in the plan.

#### **Response:**

On pages 26 and 27 of the section, "Impact Topics Dismissed from Further Consideration," information about the J.D. Marshall (12PR0723) and the Muskegon (12LE0381) sites, which are within the APE for the proposed project, is provided; shipwrecks outside of the APE were not mentioned because they would not be affected by the project.

As a public document, the plan/EIS cannot disclose details and specific site locations of archeological resources. The noted section provides a general historic overview of the project area, but as a resource topic dismissed from detailed analysis there is no requirement to detail all the specific sites.

### **ARCHAEOLOGY – SHIPWRECKS – COASTAL PROCESSES**

#### **Concern Statement:**

The EIS is unclear about the effects the various alternatives, including the preferred alternative with the submerged berm, would have on submerged archeological sites located along the shoreline. Some of the effects will be direct, such as the potential to place the berm within the boundaries of sites, increasing sediment flow that would cover several archeological sites, or accelerate the scouring of the lake bed at these locations. We believe that a more detailed assessment should address the potential direct and indirect impacts the proposed project activities may have on submerged cultural resources.

**Response:**

National Park Service (NPS) archeologists disagree with the presumption that nourishment material would adversely affect historic and archeological sites by accelerating the scouring effect. Nourishment activities have been conducted in the area since 1974 with no evidence of such adverse effects. Additional analysis would be conducted at the time of construction/nourishment activities to verify that the submerged resources would not be adversely affected. The illustration of the berm in the draft EIS associated with alternative E was not drawn to scale and gave the impression that stone would be placed directly on submerged resources. This was never the case. Because of concerns expressed about alternative E, a new alternative, F has been developed that meets the needs and objectives of the plan without the construction of a berm. A letter would be prepared by Indiana Dunes National Lakeshore personnel and submitted to the Indiana state historic preservation officer (SHPO) that would provide a more detailed description of the cultural resources in the project area and discuss potential effects to these resources. Per Section 106 of the National Historic Preservation Act (NHPA), implementation of the project would not proceed until the Indiana SHPO concurs with the National Park Service on a determination of “no adverse effects” to historic or archeological resources. However, with the new alternative, it is not anticipated that any of the proposed activities would alter the natural littoral drift pattern.

**PLAN – CULTURAL RESOURCES**

**Concern Statement:**

Effects of this project on submerged cultural resources have not been addressed within the draft EIS, and as such we disagree with the determination that the alternatives would have no effect on cultural resources. In addition, it would seem that the submerged cultural resources have not been addressed with regard to Section 106 of NHPA.

**Response:**

The National Park Service has already initiated consultation with SHPO.

The National Park Service does not believe that putting sediments into the water will have an adverse effect on submerged resources, and no sediment would be placed directly on resources during nourishment activities under any alternative.

The illustration in the draft EIS of the berm in alternative E was not to scale and gave the impression that stone would be placed directly on submerged resources. This was never the case. However, because of concerns expressed about alternative E, a new preferred alternative has been developed that meets the needs and objectives of the plan without the construction of a berm.

**PLAN – CULTURAL RESOURCES – ADDITIONAL DOCUMENT REVIEW**

**Concern Statement:**

Previous and current research which addresses submerged cultural resources along Indiana’s shoreline should have been reviewed during the preparation of the draft EIS. The potential effects of the proposed project on the submerged resources were only addressed in a generalized manner - the effects of each of the alternatives were not adequately defined.

**Response:**

The cited previous and current documents will be reviewed by an NPS archeologist.

As noted by one of the commenters, some of the new research was unavailable to the National Park Service when the draft was developed. References will be included to the commenters report in the bibliography.

Under the new preferred alternative, the National Park Service will not be placing cobble on submerged resources.

The National Park Service has already initiated consultation with SHPO.

**PLAN – CULTURAL RESOURCES**

**Concern Statement:**

There are no archaeologists included on the list of “Preparers and Consultants,” nor was any reference made to the NPS’s submerged cultural resource team.

**Response:**

The list of “Preparers and Consultants” will be revised to reflect the NPS archaeologist Jay Sturdevant on the plan/draft EIS planning team.

**Concern Statement:**

It is recommended that the NPS include the following conditions within the draft EIS (1) Section 106 of the NHPA would be completed; (2) the Indiana SHPO would be consulted on any proposed project activity; (3) an archaeological survey would be conducted; and (4) archaeological sites would be avoided or mitigated) as well as the assessment of potential impacts in each applicable section of the draft EIS in regards to cultural resources. It is also recommended that a current records review be conducted to identify all known archaeological sites within the area.

**Response:**

The park has initiated consultation with the SHPO. Additional analysis would be conducted at the time of construction/nourishment activities to verify that the submerged resources would not be adversely affected. A letter would be prepared by Indiana Dunes National Lakeshore personnel and submitted to the Indiana SHPO that would provide a more detailed description of the cultural resources in the project area and discuss potential effects to these resources. Per Section 106 of NHPA, the National Park Service would seek a determination of “no adverse effects” to historic or archeological resources from the Indiana SHPO.

The National Park Service will include in the final EIS the conditions that the Indiana SHPO will be consulted on any proposed project activity in addition to the mitigation already included in the draft EIS in chapter 2 (page 50) that states, “areas selected for construction and beach nourishment activities would be surveyed to ensure that cultural resources (i.e., archeological

sites, historic structures, and cultural landscapes) in the area of affect are identified and protected by avoidance or, if necessary, mitigation measures.”

## **BEACH NOURISHMENT – GENERAL – AQUATIC FAUNA**

### **Concern Statement:**

The EIS is unclear how it addresses terrestrial and aquatic site disturbance issues within the APE. Fish displacement and potential effects on fish spawning should be minimized, and localized effects on benthic communities should be examined. Further, on-site best management practices (BMPs) need to be incorporated to protect adjacent habitats, and efforts taken to prevent impacts to threatened and endangered species.

### **Response:**

Displacement of fish assemblages would be minor and limited in scope. Fish would tend to avoid the immediate placement area, but would remain in the coastal system and return once conditions return to normal (Horvath 1999). While the displacement would be limited, the park service will work with the Indiana Department of Natural Resources (IDNR), who has permitting authority over beach fill operations, to time beach nourishment events to minimize these impacts. Beach nourishment at reaches 1 and 3 has been ongoing, off and on, for the past 25 years or more. These nourishment activities have all been coordinated with IDNR, and to date there have been no long-term impacts associated with fish displacement.

Since beach nourishment activities have been going on for some time, it is likely the current composition of the benthic community in the shoreline affected by beach nourishment is a reflection of those activities. The activities would be detrimental to individual benthic organisms or localized communities within the affected shoreline, but would not significantly alter the benthic populations in the Southern Lake Michigan shoreline as a whole.

Impacts to terrestrial systems from the active beach fill operations are also associated with beach nourishment. Appropriate BMPs would be used when applicable. Typical construction site BMPs that would not be applicable to beach nourishment would include those associated with filling riparian wetlands (lake/shore interface) and some erosion prevention measures.

In accordance with Director’s Order 77 and Procedural Manual #77-1: Wetland Protection (January 2012), the NPS classifies wetlands according to the Cowardin system under which the system definition states that a wetland must have at least one of three attributes. Shorelines and beaches meet the third attribute: the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year. Per Procedural Manual #77-1, the interface between Lake Michigan and the beach is considered wetlands and as such needs to have a Wetlands Statement of Finding completed. Procedural Manual 77-1, section 4.2 “Excepted Actions” identifies certain types of activities that require modified approaches to achieve the objectives of E.O. 11990 while reducing delay and paperwork. “Excepted Actions” described in this subsection are those actions that may be excepted from the Statement of Findings requirements described in sections 5.3.4 and 5.3.5 and the compensation requirements discussed in section 5.2.3 of these procedures. The specific exception is (h) Actions designed to restore degraded (or completely lost) wetland, stream, riparian, or other aquatic habitats or ecological processes. For this exception, “restoration” refers to reestablishing environments in which natural ecological processes can, to the extent practicable, function as they did prior to disturbance.

Due to the nature of beach nourishment as a mitigative measure to protect beach “wetlands” the National Lakeshore completed a sediment compatibility analysis (Morris and Eshlemen 2011) for the most probable beach nourishment sources and submitted to the NPS Water Resources Division requesting an exemption from the Rule. The sediment compatibility analysis demonstrated that beach nourishment materials from in-lake sources were sufficiently compatible to grant the requested exemption.

Typically BMPs are put in place to prevent the excessive erosion of disturbed lands and limit the mobility of those suspended sediments. These measures are not applicable in this instance as they are in direct contradiction with the intended outcome of the beach nourishment (i.e., sediment transport).

## **BEACH NOURISHMENT – GENERAL – CLIMATE**

### **Concern Statement:**

Figures illustrating beach nourishment areas in the EIS are unclear and out of scale and the operational details for the sand bypass system are unclear during the winter months. We suggest using an adaptive management approach to determine beach nourishment needs through time, and that dredged sands be kept in the littoral system and not disposed of offshore.

### **Response:**

The current preferred alternative is to primarily use nourishment material from dredged and non-dredged sources with onshore placement. There is no intent to dispose of sediments offshore. The specific source of the material would be determined in coordination with the IDNR.

The images in figure 3-5 are conceptual, depicting the general areas identified for beach nourishment under the alternatives presented; specific nourishment events could take place anywhere within these general areas. Often beach nourishments in the past have been tied to necessary dredging operations at adjacent harbor facilities. Since these harbors are the primary blocking mechanism of littoral sediment transport with the National Lakeshore, they routinely need maintenance and associated funding needed to maintain these harbors vary depending on a number of complex factors. This inherent uncertainty tied to maintenance operation facilitates the need for the EIS to capture a wide range of placement volumes. This does not preclude the modeling studies that have shown that the 105,000 yds<sup>3</sup> for reaches 1 and 2, and 74,000 yds<sup>3</sup> for reaches 3 and 4 of nourishment volumes proposed in the draft EIS would be required for the foreseeable future without respect to maintenance dredging needs.

For alternatives that include the proposed sand bypass system, the bypass system would be located below the frost line and the pump systems would require on-going maintenance to properly function following the winter months.



## **BEACH NOURISHMENT – GENERAL – FREQUENCY**

### **Concern Statement:**

The EIS does not provide sufficient variety in the range of alternative with respect to placement years. We suggest the EIS consider a wider range of placement options that incorporate placement frequency at more than just 1 and 5 years. We recommend alternative C-1 for reaches 3 and 4.

### **Response:**

There are seven alternatives for reaches 1 and 2 and four alternatives for reaches 3 and 4, for a total of 11 alternatives presented in the draft EIS. In addition, alternatives that were considered but eliminated from further consideration are discussed in Chapter 2. The analysis of annual and 5-year nourishment frequencies captures a reasonable range for nourishment activities. There could be a limitless amount of variation that could conceivably be analyzed as alternatives (such as nourishment intervals between 1 and 5 years, and variations in quantities and placement length); however, the National Park Service believes the alternatives selected represent a reasonable spectrum, and that inclusion of multiple sub-variations would present no additional benefit in presenting the most environmentally acceptable and cost-effective plan.

This plan will not preclude necessary maintenance dredging up-drift of either reaches 1 or 3, however it should be understood that maintenance dredging alone will not provide quantities of sediment necessary to satisfy the sediment deficit at these sites. The intent was to fulfill the sediment deficit at reaches 1 and 3 regardless of other actions, such as maintenance dredging, which does not provide the quantities needed.

The preferred alternative for reaches 3 and 4 has been revised to alternative C-1 with annual nourishment.

## **BEACH NOURISHMENT – GENERAL – SAND**

### **Concern Statement:**

The EIS is unclear in defining the physical, chemical, and biological condition of acceptable beach nourishment sand. Methods for identifying acceptable sources should be clearly defined, and priority should be placed on using dredged source material rather than trucked in materials.

### **Response:**

The current preferred alternative is to use nourishment material from a dredged source with onshore placement. The dredging source would be determined during the permitting process, based on consultation with local stakeholders and consideration of engineering constraints.

The lakeward boundary of the park extends 300 feet from the ordinary high-water mark into Lake Michigan. This shoreline area is highly dynamic and, for most of the 13 miles of shoreline within the park, is sediment limited (in need of nourishment). Dredging materials from within the park boundary is impractical and directly contradictory to the objectives of the plan/EIS. However, sediments that have accreted further offshore in the vicinity of both the Michigan City Harbor and Burns International Harbor continue to cause problems with both navigation and industrial uses due to their excess. These two locations have been identified as the most probable donor locations for beach nourishment sediments. As such, the National Park Service has



assessed the physical, chemical, and biological conditions of the target nourishment areas and performed a sediment compatibility analysis (Morris and Eshlemen 2011; Simon et al. 2012) to ensure those accreted donor nourishment materials meet the desired criteria.

The intent of beach nourishment is to replicate, with donor materials, the ambient condition such that the nourished condition is indistinguishable physically, chemically and biologically from the ambient or native condition. To establish the ambient condition for beach nourishment activities within the Indiana Dunes National Lakeshore, the park used a geometric design to characterize both long-shore and cross-shore variability in sediments by collecting grab samples from 70 locations (nodes) within a 100 by 90 meter sampling zone. Nodes were arranged in a staggered grid formation maintaining 10 meters distance from each adjacent node. Sampling zones were arranged such that approximately half the nodes would fall on land while the other half would be in the water. Samples within each nourishment area were composited and analyzed for sediment chemistry, toxicity, grain size characterization, porosity, and compaction. Specific methods and results from these analyses can be found in Simon et al. 2012.

The text for the no action alternative in reach 1 will be revised to include nourishment from both mined and dredged sources.

## **BEACH NOURISHMENT – MT. BALDY – SAND**

### **Concern Statement:**

The EIS is unclear in defining the beach nourishment target area within reach 1. The EIS refers to Mt. Baldy, but we question if the EIS should indicate Crescent Dune which is adjacent to Mt. Baldy to the east? Additionally, the EIS repeatedly suggests sand mining updrift of Michigan City Harbor. However, little information is provided on the implication to Michigan City Beaches should this occur. We recommend the EIS focus more attention on utilizing those sands that have bypassed the Harbor.

### **Response:**

The current preferred alternative is to use nourishment material from a dredged source with onshore placement. The EIS has used the term Mt. Baldy because it is a readily recognized landmark, but the nourishment would actually take place at the adjacent Crescent Dune.

The preferred alternative has been revised to a new hybrid alternative F which includes annual beach nourishment with a mix of small natural stone at the shoreline of reach 1. The source location of the nourishment material would be determined in coordination with IDNR in areas of accretion so that dredging activities would not disturb areas of equilibrium. Alternative sources would be identified prior to implementation of the alternatives. Accretion areas have been identified as source locations and dredging would bring these areas to more closely represent natural shoreline processes. In the event that an identified source is not appropriate, an alternate location would be selected. The text in the plan/EIS has been revised to reflect coordination with IDNR for selection of nourishment source material.

With regard to the concerns that the National Park Service focus more on utilizing the sediments that have bypassed the Michigan City facility, the sediment budget calculated for reaches 1 and 2 clearly indicate that there is insufficient sediment getting beyond that facility. Therefore the EIS indicates a desire to obtain sediments that are trapped by that facility and return them to the shoreline system.

Note that because lake levels have dropped, more beach is visible; however, that does not mean that the beach is building up. The Mt. Baldy area continues to be exposed to continued erosion which would be more pronounced as lake levels rise again.

## **BEACH NOURISHMENT – PORTAGE LAKEFRONT – OTHER**

### **Concern Statement:**

The preferred alternative for reach 3 will provide too much sand in one slug and will have unintended effects on navigational access to Burns International Harbor. Increased frequency of small slugs of sand will prevent excessive navigational issues and will also allow for seasonal needs dictated by extreme weather events to be addressed more directly.

### **Response:**

Under the discussion of alternative C-5: Beach Nourishment via Dredged Sources, 5-Year Frequency in Chapter 2 (page 67), the text states, “Sediment could be captured by the federal channel at the Burns International Harbor, which could increase maintenance dredging costs.” The National Park Service acknowledges that dredging would be required to reestablish more natural flow as more sediment in the water would naturally migrate into the waterway.

Dredging is currently conducted by the U.S. Army Corps of Engineers (USACE) as a duty to maintain navigation of the harbor; National Park Service assumes that the USACE would continue to maintain the harbor during storm events if nourishment material from reach 3 is deposited in the harbor through natural wave action. While wave induced deposition of sediments into the harbor are unavoidable natural consequences of operating a harbor along southern Lake Michigan that blocks littoral sediment transport, the National Park Service realizes that placing an entire 5-year sediment deficit volume of nourishment material on the beach at Portage Lakefront and River Walk (alternative C-5) may exacerbate navigational issues at the harbor beyond that which would naturally occur. Thus, the preferred alternative for reaches 3 and 4 has been changed to alternative C-1 with annual nourishment which was assessed in the draft EIS. Under alternative C-1 only the annual sediment deficit would be placed in a given year. Any harbor maintenance issues associated with this placement volume should be consistent with natural conditions.

## **COBBLE BERM – COST, ENGINEERING, AND SHORELINE DYNAMICS**

### **Concern Statement:**

The EIS does not sufficiently discuss: the scope of the cost of implementing alternative E, Submerged Cobble Berm; the engineering specifications and functional application of the cobble berm technology in Lake Michigan; or the cobble berms effects on wave and current dynamics along the shoreline. The cobble berm would modify the existing shoreline dynamic and push the erosion problem further to the west along reach 2.

**Response:**

Due to the conceptual nature of the alternative presented in the Draft EIS, the costs were estimates based upon professional judgment. The estimated cost for alternative E, Submerged Cobble Berm and Beach Nourishment, Annual Frequency was \$20.4 million. It was recognized that additional engineering studies would be necessary to implement the alternative. However, a hybrid alternative (alternative F), which incorporates the full diversity of nourishment materials using an approach other than the berm, has been developed as the new preferred alternative. This alternative, consisting of annual nourishment with a mix of small natural stone at the shoreline at reach 1, incorporates desired aspects of multiple alternatives which will meet park purposes and objectives, yet addresses public concern with the draft preferred alternative E. There is no reason to believe that nourishment activities in Reach 1 would cause erosion problems further west down the shore in Reach 2.

**COBBLE BERM – HABITAT – CLAY VALLEY**

**Concern Statement:**

The EIS does not fully address the effects of the cobble berm on existing lake-bottom conditions. The cobble would increase down-cutting and threaten unique offshore “clay valley” habitats used for fish spawning.

**Response:**

The Indiana Dunes National Lakeshore shoreline within reach 1 is currently experiencing a high rate of erosion. The sandy substrate at the base of Mount Baldy has eroded away, exposing a clay layer that is now being undercut by wave action. The cobble berm would decrease rather than increase down-cutting.

The submerged cobble berm would be comprised of aggregate material from local glacial deposits which would be re-distributed across the lake bottom by natural wave action. The distribution would move the smaller aggregate closer to the shoreline, while the larger material would generally stay within a few feet of the submerged cobble berm. Distribution would be variable, depending on the intensity of storm events. Prior to breakdown of the submerged cobble berm, wave energy within the nearshore would be dissipated, thus increasing the likelihood of sediment retention in the nearshore. After the submerged cobble berm has been spread along the lake substrate, lakebed down-cutting would decrease as the aggregate material would create a protective layer.

The region of the clay utilized by yellow perch for spawning lies in 30 plus feet of water. The 30-foot depth is beyond the depth of closure where active wave energy would transport the cobble material; therefore, the material would not be expected to move into the clay valley depressions and impact the yellow perch populations.

However, the hybrid alternative (alternative F), which incorporates the full diversity of natural sediment aggregate using an approach other than the berm, has been developed as the new preferred alternative. This alternative, consisting of annual nourishment with a mix of small natural stone at the shoreline at reach 1, incorporates desired aspects of multiple alternatives which will meet park purposes and objectives, yet addresses public concern with the draft preferred alternative E.

## COBBLE BERM – HABITAT – INVASIVES

### Concern Statement:

The EIS does not fully address the ecological consequences of placing large quantities of cobble on the lakebed, nor does it provide sufficient evidence that these materials are a natural component of the system. These cobble materials would provide habitat for invasive fish species and attachment surfaces for both invasive mussels and cladophora adjacent to known yellow perch spawning habitats.

### Response:

Glacial remnants of rock and cobble are common along the dynamically stable shoreline along reach 1 (Morris et al. 2014). The sandy habitats around Beverly Shores were sampled in the summer of 2011 to determine sediment composition. Sediment samples were collected from a matrix of 70 stations distributed both long-shore and cross-shore to capture a 100-meter reach.

No alternative proposed would either promote or hinder Zebra or Quagga mussel populations. These mussel species already exist in Lake Michigan and none of the proposed alternatives would alter this fact. Live Zebra and Quagga mussels are infrequently found in the active shoreline region as the dynamic and abrasive nature of the churning sediment and rock prevents stable attachment surfaces. In the summer of 2011, over 500 sediment samples were collected using a sediment dredge from the shoreline affected by beach nourishment. No live Zebra or Quagga mussels were found, though there were a number of dead shells likely washed in from deeper, more stable habitats that would be unaffected by shoreline processes.

The abrasive nature of the dynamic shoreline regions also limits the ability of *Cladophora* to attach to solid surfaces. The successful integration of natural gravels and stones into the sand rich composition of the shoreline area of reach 1 will result in a condition that is indistinguishable from that already existing in dynamically stable down-drift areas (Morris et al. 2014). As there is currently no excessive cladophora or botulism issue in this area, there is no reason to believe that restoring reach 1 to a condition approximating conditions in the dynamically stable (Baird 2004) sections of reach 2 will change.

The shoreline region affected by beach nourishment is not a highly utilized habitat by round gobies. The dynamic sediment rich habitats found along the southern Lake Michigan shoreline do not offer the larger interstitial spaces preferred by round gobies for reproduction. While larger stone substrate is natural to the system (Morris et al. 2014; Hawley and Judge 1969) it is typically heavily embedded and regularly covered and exposed by the migration of sandbars both long-shore and cross-shore (Davis and McGeary 1965). National Park Service observations have shown that round goby presence along the shoreline is limited, and dominated by young individuals less than 50 millimeters (mm) long, generally considered one year old (MacInnis and Corkum 2000). From 2010 to 2011, over 240 sampling efforts, spread across 24 shoreline reaches within the Indian Dune National Lakeshore, were completed. A total of 22,924 individual fish were collected representing 31 species. Only 82 round goby individuals (0.004% of the total assemblage) were collected, having an average length of 50 mm. These data are consistent with other research around the Great Lakes. Moran and Simon (2013) found a similar relationship with natural gravel/sand substrates in Lake Erie. They observed a significant decrease in both relative abundance and catch per unit effort of round goby over natural gravel habitats. They attributed this, in part, to the highly territorial nature of adult male gobies (Jude et al. 1995) and their potential exclusion of smaller individuals from other, more desirable, habitats (Ray and



Corkum 2001; Johnson et al. 2005). There is no evidence to suggest the restoration of natural substrates, through beach nourishment would provide habitat opportunities that do not already exist along the shoreline. In actuality, research has shown that migration pathways of round gobies have not been via the shoreline area impacted by beach nourishment (Moran and Simon 2013), rather, they have spread throughout the region via the more stable lakebed pathways in water depth exceeding 30 feet, beyond the depth of closure, and outside the influence of costal processes. The clay valleys off-shore of reach 1 reside in approximately 30-feet of water and are already impacted by round gobies independently of beach nourishment activities. Habitats affected by beach nourishment are not desirable for round goby reproduction and those round gobies found in these habitats are small in size and represent only a tiny fraction of the total fish fauna.

Note that a hybrid alternative (alternative F), which incorporates the full diversity of natural sediment aggregate using an approach other than the berm, has been developed as the new preferred alternative. This alternative, consisting of annual nourishment with a mix of small natural stone at the shoreline at reach 1, incorporates desired aspects of multiple alternatives which will meet park purposes and objectives, yet addresses public concern with the draft preferred alternative E.

## **COBBLE BERM – NAVIGATIONAL / RECREATIONAL HAZARD**

### **Concern Statement:**

Figures provided in the EIS do not accurately present the placement of the cobble berm nor does it provide adequate information on how the berm will be marked to minimize risk to recreational boating craft.

### **Response:**

It was recognized that additional engineering studies would be necessary to implement the alternative. The berm was intended to be installed in at least 6 feet of water which should have been no hazard for recreational boating. However, the potential for creating an attractive hazard was recognized, and the intent was to provide some temporary warning devices to keep swimmers away until the berm dissipated. A hybrid alternative (alternative F), which incorporates the full diversity of natural sediment aggregate using an approach other than the berm, has been developed as the new preferred alternative. This alternative, consisting of annual nourishment with a mix of small natural stone at the shoreline at reach 1, incorporates desired aspects of multiple alternatives which will meet park purposes and objectives, yet addresses public concern with the draft preferred alternative E.

## **COBBLE BERM – COBBLE – PHYSICAL MAKE-UP, INTEGRATION, AND MOVEMENT**

### **Concern Statement:**

The EIS does not fully address the hydrologic consequences of placing large quantities of cobble on the lakebed, nor does it provide sufficient evidence that these materials are a natural component of the system.

**Response:**

Due to the conceptual nature of the alternative presented in the draft EIS, it was recognized that additional engineering studies would be necessary to implement the alternative.

In 2012 the National Park Service studied the presence of large particles >19 mm (Table 1) in the onshore and aquatic zones along the southern coast of Lake Michigan, because this fraction was considered a critical part of the natural substrate (Morris et al. 2014). Figure 1 depicts the littoral transport in reaches 1 and 2.

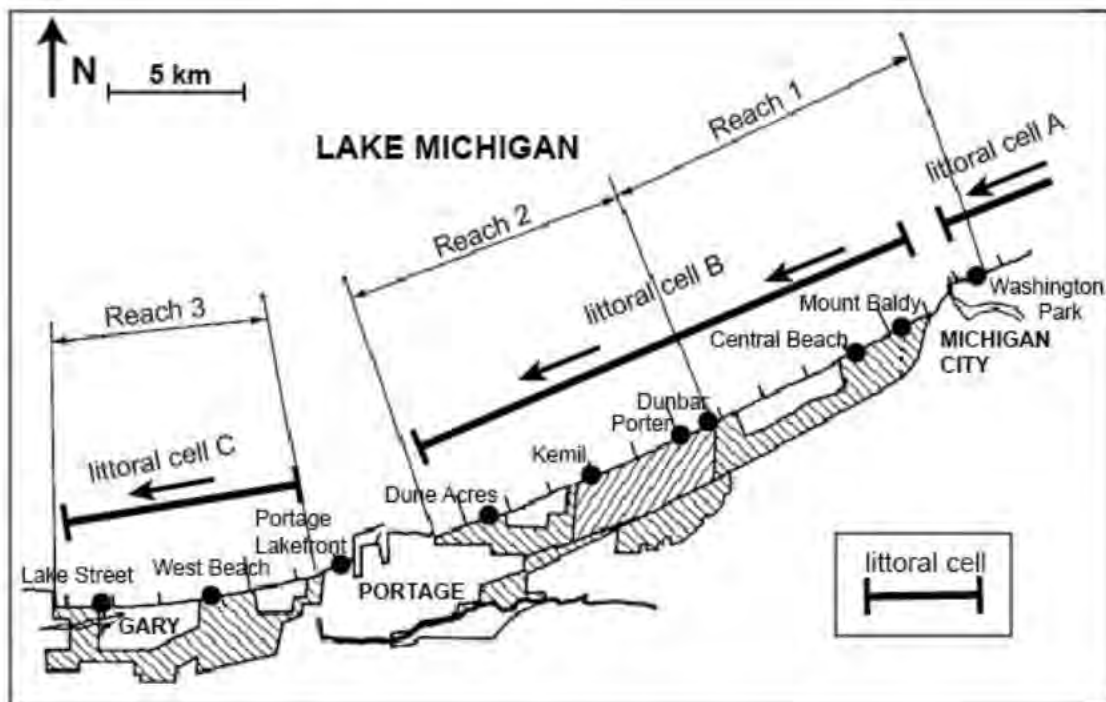


FIGURE 1. LITTORAL TRANSPORT.

TABLE 1. LARGE PARTICLE SIZE CATEGORIES FOLLOWING THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) (UNIFIED) GRAIN-SIZE CLASSIFICATION. THE SEDIMENT SIZE PROVIDED REPRESENTS THE LOWER LIMIT OF EACH CATEGORY.

Size (mm)	Size (in.)	Classification
>300	>12.0	Boulder
75	3.0	Cobble
19	0.750	Coarse gravel

Particles with a single axis >19 mm were collected from five random square meter grids placed in the wash zone (land/water interface) during a 15 minute search and from three targeted square meter grids in a 15-minute search of the onshore zone. Individual particles were measured in the laboratory for maximum length or long diameter (a-axis), maximum width or intermediate diameter (b-axis), and maximum depth or short diameter (c-axis), and characterized in to three categories: compact, elongate, or platy (Figure 2).

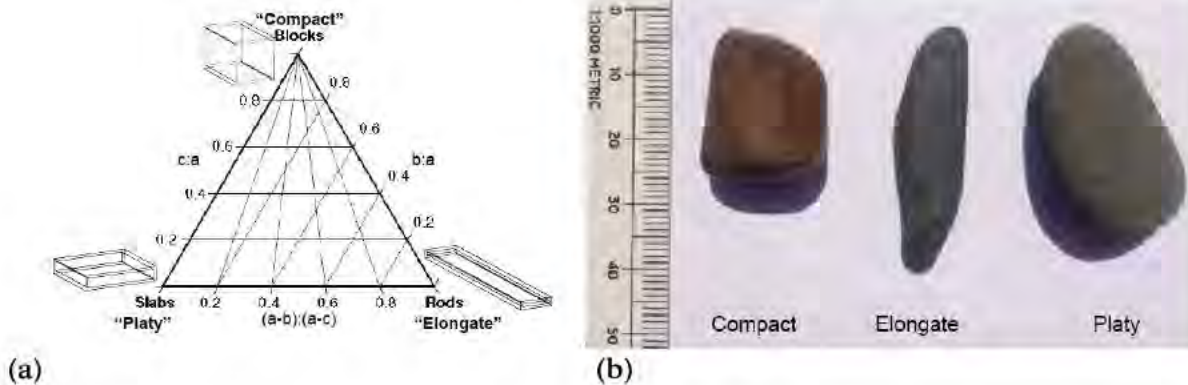


FIGURE 2. (A) DIMENSIONAL CLASSIFICATION OF LARGE PARTICLES (>19 mm) AFTER THE WORK OF SNEED AND FOLK (1952). (B) EXAMPLES OF COMPACT, ELONGATE, AND PLATY LARGE PARTICLES.

**Large particles in the onshore zone.** Six beaches contained large particles in the onshore zone though the number and dimensions varied from east to west, coincident with the local direction of movement of littoral drift. Beaches in reaches 1 and 2 including Mt Baldy, Central Beach, and Dunbar, are considered erosional or dynamically stable. These reaches contained a higher number of large particles than areas studied to the west in reach 3 and individual particles had a comparatively larger maximum length (a-axis). The large particles at Mt Baldy ( $n=75$ ) had a maximum diameter length that varied from coarse gravel to small cobbles (range: 20.26-93.30 mm) with the mean size being coarse gravel 35.56 mm (Figure 3, Table 2). The large particles at Central Beach ( $n=23$ ) had a maximum length that varied from coarse gravel to large cobbles (range: 34.09-139.51 mm) with the mean size being coarse gravel at 67.64 mm (Figure 3, Table 2). The large particles at Dunbar ( $n=107$ ) had a maximum length that varied from coarse gravel to cobbles (range: 26.35-117.40 mm) with the mean size being coarse gravel at 59.76 mm (Figure 3, Table 2).

Large particle counts decreased or were absent at accretionary beaches where the reaches experience greater deposition of finer particles. The large particles at Portage Lakefront ( $n=79$ ) had a maximum length within the coarse gravel class (range: 20.15-56.98 mm) with the mean size being coarse gravel at 30.35 mm (Figure 3, Table 2). The large particles at West Beach ( $n=31$ ) had a maximum length that varied from coarse gravel to small cobbles (range: 23.08-90.30 mm) with the mean size being coarse gravel 46.79 mm (Figure 3, Table 2). There were no particles >19 mm found at Lake Street in the onshore zone. The large particle distributions at all onshore reaches are dominated by coarse gravels (Tables 4).



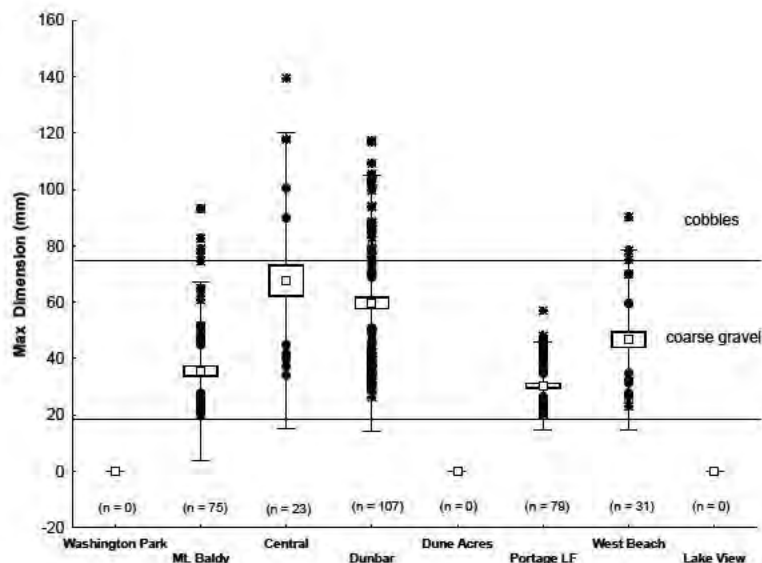


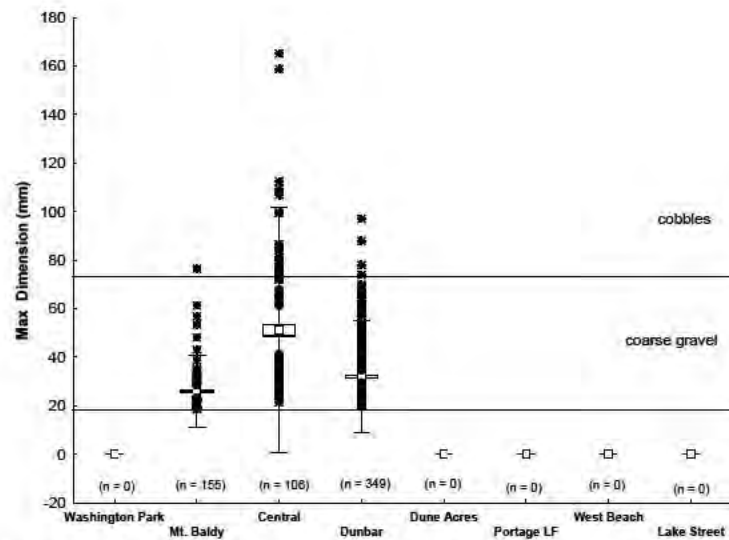
FIGURE 3. PEBBLE COUNT AND MAXIMUM DIMENSIONS OF LARGE FRACTION MATERIALS FROM THE ONSHORE ZONE IN EIGHT BEACHES IN THE INDIANA DUNES NATIONAL LAKESHORE.

TABLE 2. ONSHORE

Site	Coarse Gravel (19-75 mm)	Cobbles (75-300 mm)	Total Count
Mt. Baldy	71	4	75
Central Beach	15	8	23
Dunbar	82	25	107
Portage Lakefront	79	0	79
West Beach	28	3	31
Total	275	40	315

**Large particles in the aquatic zone.** Large particles in the aquatic (nearshore) zone are important for general sediment characterization and constitute a critical component of the substrate with regards to aquatic habitats. Large particles at Mt. Baldy ( $n=155$ ) had a maximum length that varied from coarse gravel to small cobbles (18.41-93.30 mm) with the mean size being on the finer side of the coarse gravel class (25.83 mm) (Figure 4, Table 3). The largest particles were observed at Central Beach. Central Beach ( $n=129$ ) had a maximum length that varied from coarse gravel to cobbles (21.47-165.10 mm) with the mean size being coarse gravel (51.17 mm) (Figure 4, Table 3). Dunbar Access had the highest total large particle count ( $n=256$ ) and particles had a maximum length that varied from coarse gravel to small cobbles (20.01-117.40 mm) with the mean size being coarse gravel (32.01 mm). The large particle distributions at all onshore reaches are dominated by coarse gravels (Figure 4, Table 3).

Relationships among the six beaches show that the accretionary beaches of Washington Park, Dune Acres, Portage Lakefront, West Beach, and Lake Street Access did not contain large particles >19 mm in the aquatic zone (Figure 4). The data are consistent with results from onshore-offshore sediment profiles in previous work that observed small areas of anomalously coarse sediment (Hawley and Judge 1969) and a strong correlation between coarse sediment and troughs in the near shore zone (Davis and McGeary 1965).



**FIGURE 4. PEBBLE COUNT AND MAXIMUM DIMENSIONS OF LARGE FRACTION MATERIALS FROM THE AQUATIC ZONE IN EIGHT BEACHES IN THE INDIANA DUNES NATIONAL LAKESHORE.**

TABLE 3. AQUATIC

Site	Coarse Gravel (19-75 mm)	Cobbles (75-300 mm)	Total Count
Mt. Baldy	142	12	155
Central Beach	92	14	106
Dunbar	346	3	349
Portage Lakefront	0	0	0
West Beach	0	0	0
Total	580	29	610

**Pebble Dimensions.** Note that each particle is classified on the ASTM (unified) Classification scale by measurement of the axis with longest diameter. Particles >19 mm are classified as “coarse gravel” if the long-axis measures 19–75 mm, “cobbles” if the long-axis measures 75–300 mm, and “boulders” if the long axis measures >300 mm. All large particles found on the southern shoreline of Lake Michigan fell within the range of coarse gravel to cobbles (19–300 mm) (Figure 3 and 4). However, the largest particle found was a cobble found at Central Beach, measuring 165.10 mm (6.5 in.).

All particles in this study meeting the size criteria of large pebbles or cobbles were classified as either compact, platy, or elongate according to the work of Sneed and Folk (1958) and Pirie (1965) (Figure 2, Tables 4 and 5). Particles are considered compact when the c:a and b:a ratios both exceed 0.5. Particles are classified in this study as platy when the c:a and b:a ratios are both less than 0.5 and when (a-b):(a-c) is less than 0.5. Remaining particles are classified as elongated according to the classification.

Large particles >19 mm were observed in the onshore zone at five of the seven study areas and >90% of those particles were classified as platy or elongate (Table 4). These particles represent



the flat “beach rocks” often described by visitors. Large particles >19 mm were observed in the aquatic zone of three of the seven study areas (Table 5). Platy or elongate particles constitute 49%-75% of the large particle component of the substrate. At Mt. Baldy the large particle substrate in the aquatic zone was comprised of 25% compact particles and 75% flat (platy or elongate) particles. At Central and Dunbar Beaches the aquatic substrate was comprised of ~50% compact particles and ~50% flat (platy or elongate) particles.

**TABLE 4. CLASSIFICATION OF LARGE PARTICLES >19 MM COLLECTED AT INDIVIDUAL STUDY SITES FOR THE ONSHORE ZONES ACCORDING TO SNEED AND FOLK (1958). NUMBER IN PARENTHESES REPRESENT PERCENT OF TOTAL PARTICLES.**

Site	Total Particles	No. of Compact	No. of Platy	No. of Elongate
Michigan City	0	0	0	0
Mt. Baldy (East)	75	0	64(85%)	11(15%)
Central Beach	23	1(4.5%)	21(91%)	1(4.5%)
Dunbar	107	0	88(82%)	19(18%)
Portage Lakefront	79	1(1)	62(79%)	16(20%)
West Beach	31	0	27(87%)	4(13%)
Lake Street	0	0	0	0

**TABLE 5. CLASSIFICATION OF LARGE PARTICLES >19 MM COLLECTED AT INDIVIDUAL STUDY SITES FOR THE AQUATIC ZONES ACCORDING TO SNEED AND FOLK (1958). NUMBER IN PARENTHESES REPRESENT PERCENT OF TOTAL PARTICLES.**

Site	Total Particles	No. of Compact	No. of Platy	No. of Elongate
Michigan City	0	0	0	0
Mt. Baldy (East)	155	40(26%)	52(34%)	63(41%)
Central Beach	106	54(51%)	35(33%)	17(16%)
Dunbar	349	160(46%)	77(22%)	112(32%)
Portage Lakefront	0	0	0	0
West Beach	0	0	0	0
Lake Street	0	0	0	0

A two-dimensional numerical model (COSMOS) was used to calculate sediment transport rates along the shoreline at selected intervals of 1.25 miles for current and historic pre-harbor conditions. The beach profiles extended out to a depth of approximately 15 meters (or approximately 49 feet) below chart datum (LWD). It was determined that the net longshore sediment transport gradually decreases from New Buffalo (200,000 yd<sup>3</sup> updrift of Michigan City) east to the Burns International Harbor. The average longshore sediment transport rate is estimated at less than 30,000 yd<sup>3</sup> per year near the Gary-U.S. Steel Harbor. Generally, larger particle size material would have a slower transport rate than finer sediment. Additional studies would be necessary to determine the sediment transport rate for the specific nourishment mix proposed.

## **ALTERNATIVE DEVELOPMENT PROCESS**

### **Concern Statement:**

One commenter expressed concern that the analysis of impacts in this EIS may be too speculative because of the conceptual nature of the alternatives. In addition, concerns are expressed about the length (shelf life) of the EIS at 20 years, rather than a much greater planning horizon.

### **Response:**

The plan/final EIS is a management plan that would provide the partners/players/participants with guidelines for management decisions specific to shoreline restoration. Following approval of the plan, the National Park Service would be able to implement annual beach nourishment procedures outlined within the plan should that opportunity arise in the near future. The National Park Service believes that the alternatives (which present approaches for shoreline restoration) in this plan are defined with an overall appropriate level of detail to determine the general environmental and social effects allowing us to select a proposed alternative. Additional studies and plans may be necessary to move toward implementation as acknowledged in the plan/final EIS.

The 20-year period of analysis is National Park Service's normal planning horizon and is much more conservative. The National Park Service feels that forecasting out 50 years would be less accurate and potentially unresponsive to changes in the local environment than the shorter defined planning period.

## **CHOOSING BY ADVANTAGES PROCESS FOR SELECTION OF THE PREFERRED ALTERNATIVES**

### **Concern Statement:**

Concern was expressed about the process used to identify a preferred alternative.

### **Response:**

The choosing by advantages (CBA) process is the National Park Service's method of providing a recommendation for the preferred alternative. Planning team decisions made during the CBA process were based on the importance of advantages between the alternatives. This involved identifying the attributes or characteristics of each alternative relative to the factors described in the Draft EIS, determining the advantages for each alternative for each factor, and then assessing the importance of each advantage. The relationship between the advantages and costs of each alternative were also considered. The CBA process was documented, is reproducible, and provided the rationale for recommending the preferred alternatives. Note: The alternatives presented in this plan present general guidelines for shoreline restoration and management. Site-specific elements within these general guidelines could require coastal modeling and scientific analysis prior to implementation however this does not preclude beach nourishment activities resulting from harbor maintenance activities.

## DEVELOPMENT OF COSTS

### Concern Statement:

Commenters state that an economic analysis was not part of the plan. Some felt that more attention to the costs of the proposals would have led to a better evaluation of them. The lump sum costs were felt to be inadequate. In addition, they question assumptions concerning the timing of activities, and note that some of the costs concerning the sediment bypass alternative seem inflated.

### Response:

There is a cost comparison presented in Tables 2-2A and 2-2B of the draft EIS, and costs are included in the text description of the alternatives in Chapter 2. The relationship between the advantages and costs of each alternative were also considered during the CBA workshop. This information was used to identify the alternatives that provided the National Park Service and the public and private partners the greatest advantage for the most reasonable cost. Detailed costs were not developed due to the conceptual nature of the designs proposed for the alternatives. Costs estimates were conservatively developed for individual alternatives and did not assume combined mobilization events. The intent of the statement, “in all reaches of the project area at the same time” is that shoreline restoration would be implemented across all reaches of the project area from the implementation of the plan, rather than focusing on one reach and then another.

The costs associated with the bypass systems are only partially related to the length of the piping and the initial construction of the system. With alternative D for reaches 1 and 2, the source for material is located at some point north of the Michigan City Marina. The specific location of sediments will change periodically as the immediate location for the source for sediment changes. Sources immediate to the end of the bypass would likely be used first but would deplete over time. Then sediments from further away from the end of the bypass system would need to be moved to the bypass system, resulting in increased effort and costs. The source for sediment in alternative D for reaches 3 and 4, which is nearly half the annual volume needed in reaches 1 and 2, is not likely to change since it is located at the intake for the Northern Indiana Public Service Company (NIPSCO)/Bailly complex. Besides logistical costs, maintenance costs were also a factor; with nearly twice the volume, maintenance costs associated with the bypass in reaches 1 and 2 meant greater long term costs.

## REQUIREMENT FOR FURTHER STUDIES

### Concern Statement:

Commenters requested more analysis of some alternatives. Concerns were expressed about the potential impacts that needed more study, including impacts that are not necessarily environmental. Finally, one commenter expressed concern that while the EIS states where further studies are necessary, it does not clearly state what actions can take place after the finalization of the EIS process.

**Response:**

At this point, it would be premature to provide the level of detail requested by some of the commenters since it is not known which parties may be participating in the restoration efforts in the future. As stated in the EIS, operationally the National Park Service cannot accomplish the proposal actions on its own. Full implementation would require cooperation and coordination between local, state, and federal agencies. This plan will hopefully initiate a dialogue between stakeholders, and provides a study of potential solutions going forward. The National Park Service does believe that while some level of design might be required to proceed, the impact analysis is sufficient to allow some level of beach nourishment with appropriate consultation, but without additional compliance concerns.

As stated in the Summary (on page iv) and under “Needed Future Studies and Plans” (page 38), “Once this plan is completed, many of the nourishment activities proposed under the alternatives could be implemented without further compliance or study. Other more detailed studies and plans would be needed before some specific actions could be implemented, including design specifications.” Nourishment and terrestrial management activities associated with the plan could be implemented without further compliance or study.

**REACHES 1 AND 2 NEW ALTERNATIVE PROPOSED AND REACHES 3 AND 4 NEW ALTERNATIVE PROPOSED**

**Concern Statement:**

Several commenters asked whether the National Park Service should look into replacing/modifying certain existing structures that currently interrupt the natural sediment flow along the shoreline. Other commenters suggested other modifications to the proposed alternatives by considering a 3-year nourishment interval and inquired about impacts.

**Response:**

A hybrid alternative (alternative F), which incorporates the full diversity of natural sediment aggregate using an approach other than the berm, has been developed as the new preferred alternative. This alternative, consisting of annual nourishment with a mix of natural stone at the shoreline at reach 1, incorporates desired aspects of multiple alternatives which will meet park purposes and objectives, yet addresses public concern with the draft preferred alternative E. Modification of harbor structures would not be within the National Park Service jurisdiction to implement. As such, modification of NIPSCO pier would not be within the National Park Service jurisdiction to implement.

The analysis of annual and 5-year nourishment frequencies captures a reasonable range for nourishment activities. There would be a limitless amount of variation that could conceivably be analyzed as alternatives (such as nourishment intervals between 1 and 5-years, and variations in quantities and placement length); however, the National Park Service believes the alternatives selected represent a reasonable spectrum, and that inclusion of multiple sub-variations would present no additional benefit in presenting the most environmentally acceptable and cost-effective plan.



Timing of heavy machinery mobilization and de-mobilization along with beach closures would be coordinated to minimize public intrusion. To the extent possible, efforts would be made to minimize impacts on visitor experience by conducting beach nourishment activities during off-peak months (i.e., during fall and winter months).

## **REACHES 1 AND 2 NEW MITIGATION PROPOSED AND REACHES 3 AND 4 NEW MITIGATION PROPOSED**

### **Concern Statement:**

One commenter suggested additional mitigation be spelled out in the final EIS, and requested a greater commitment to the mitigation already in the EIS.

### **Response:**

The draft EIS was remiss in not properly defining the specific type of wetlands being referred to on page 48 for mitigation. The National Park Service has adopted the Cowardin definition of wetlands; besides the three criteria defined by the USACE as wetlands, the Cowardin definition includes shorelines that meet the USACE definition but wave action or other physical features (type of soil) prevents the formation of vegetation. For this plan, construction staging and operation would unavoidably be located within the shoreline wetland areas. Mitigation measures to minimize impacts to these types of wetlands are listed on page 48, and will be adopted by the Record of Decision. As stated on page 18, “Temporary impacts to the existing beach wetlands would be unavoidable within the specific site where the shoreline would be nourished. The post-restoration shoreline would be expected to result in the same acreage of the same wetland type as exists now, but shifted northward (or at least maintained in its present position) because a comparable shoreline profile is expected to develop. Since there would be no net loss of the beach wetland habitat, the project could be considered under the Restoration Exception in Section 4.2.1 (h) of NPS Director’s Order (DO) 77-1: Wetland Protection and Procedural Manual #77-1.” As stated on page 50, the “rare, threatened, and endangered species’ surveys would be determined as deemed warranted by NPS resource staff and specialists. It is the National Park Service’s mission to preserve park resources and it is inherent within our mission to protect rare, threatened, or endangered species that could be affected by the proposed project.” The National Park Service would make this commitment in the Record of Decision.

## **ALTERNATIVES ELIMINATED: HARDENED STRUCTURES**

### **Concern Statement:**

Commenters inquired about the consideration of a permanent fixed berm and why that was dismissed.

### **Response:**

During scoping for the selection of the proposed alternatives, the planning team determined that alternatives with permanent, hardened structures would not meet the goals of the plan. Hardened structures have historically provided protection for infrastructure from erosion and storm events. However, these structures may not have been beneficial to the entire shoreline. The alternatives developed for this plan were developed to benefit the entire shoreline as opposed to a single land owner or shoreline user. The purpose of the draft EIS is to identify and develop strategies to



restore the Indiana Dunes National Lakeshore shoreline and its processes with a reestablishment of more natural shoreline processes. The implementation of hardened structures would not be conducive to the reestablishment of more natural shoreline processes.

## **DESCRIPTION OF NO ACTION ALTERNATIVE**

### **Concern Statement:**

Commenters expressed concern that the EIS has mischaracterized the level of existing planning for the shoreline, and that the EIS has assumed existing conditions for the no action alternative that do not actually exist.

### **Response:**

Shoreline feasibility studies of the Indiana coast and Congressional authorization to conduct beach nourishment are not the same as a comprehensive shoreline restoration plan that provides comprehensive guidance for restoring natural shoreline processes and preserving the shoreline ecosystems.

The National Park Service assumes that on average, the USACE nourishment activities would continue because that is consistent with current and past nourishment activities. Although it is understood that these activities are dependent upon Congressional earmarks, and that there is no guarantee that these earmarks would continue, the approach of defining the no-action alternative based upon recent nourishment programs is the more conservative approach. Effect from the implementation of action alternatives are defined based on a comparison with the no-Action alternatives. Had the no-action alternatives been defined under the assumptions that the USACE nourishment activities would not continue, then beneficial effects of the proposed nourishment would seem exaggerated, as would the adverse effects of the implementation of the no-action alternative. In addition, it would have presented conditions at the shoreline that actually do not exist; the shoreline has benefitted from periodic nourishment.

Defining alternative A as the “no-action” alternative is consistent with the National Environmental Policy Act of 1969, as amended, regulations of the Council on Environmental Quality (40 Code of Federal Regulations 1508.9), and NPS DO 12: Conservation Planning, Environmental Impacts Analysis, and Decision-making and its accompanying handbook. The no-action defines the activities that would occur in the event that none of the action alternatives are implemented; this is not always necessarily the same as “present practice.” Since it can be assumed that the USACE would continue beach nourishment as they have in past years, it would not be realistic to evaluate an alternative where nourishment activities were terminated.

## **PROPOSED MODIFICATION TO REACHES 1 AND 2 PREFERRED ALTERNATIVE**

### **Concern Statement:**

One commenter questioned the discussion and use of adaptive management as described in the draft EIS.

**Response:**

The Draft EIS reads (page 46):

**Approaches to Adaptive Management.** Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. It involves monitoring practices to determine if they are meeting the set objectives, and facilitating changes to the management practices, if needed, to ensure the objectives are met. Adaptive management is based on the premise that managed ecosystems are complex and unpredictable, and therefore cannot be effectively managed within a rigid management context.

The process of adaptive management is vital for the success of this plan. Each of the alternatives for the shoreline and beach complex and the proposed actions for the foredune and dune complex employ an adaptive management element involving monitoring and evaluation. This means that although each alternative includes estimates as to the effectiveness of the restoration actions ultimately some of those actions could be modified over time as knowledge is gained through implementation. For example, the proposed beach nourishment program would be evaluated to determine its effectiveness over the course of the plan's life. Monitoring of the shoreline profile and near shore habitats would be conducted to ensure that park resources were not negatively impacted by the implementation of an alternative.

Adaptive management can best be defined as a process that "...involves the clear statement of objectives, the identification of management alternatives, predictions of management consequences, recognition of uncertainties, monitoring of resource responses, and learning (National Research Council 2004). Adaptive management can be seen as a process of structured decision making (Williams et al. 2007), with special emphasis on iterative decisions that take uncertainty and the potential for learning into account." (Williams, B. K., and E.D. Brown 2012; Adaptive Management: The U.S. Department of the Interior Applications Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.)

The comment on the draft EIS requests the information that would be provided for an adaptive management process. The plan does realize the only way to correct the issues identified in the purpose and need is through some sort of modification of the sediment delivery systems, directly by nourishment. The alternatives focus on nourishment with existing sources of sediment either through use of moderate amounts of material on a year-by-year basis, or by much larger amounts of material that would last a longer period. The new alternative, which is the reworking of existing alternatives, only changes the composition of the nourishment material, but the essential delivery of restoration materials is through nourishment. The solution that can be realized through this plan appears to be rather simple – replace the lost sediment.

Therefore, the adaptive approach the National Park Service will take here will be more of a conventional state-specific management approach rather than a strict adaptive management approach; our management approach in the draft EIS was incorrectly identified. The Departmental guidance defines this approach as involving an assumption "...that the objectives are appropriate, the resource system is fully observed and understood, and the resource models reflect full understanding. New data are used to track the system's current status; however, structural uncertainty and surprise are not accounted for in the assessment of management alternatives." Our management action will involve only two variables, the amount of supplemental nourishment to be placed into the system and the timing of those placements.

We have revised the discussion on page 46 of the Draft EIS.

## **REACHES 1 AND 2 PREFERRED ALTERNATIVE GENERAL QUESTIONS**

### **Concern Statement:**

Several commenters had concerns regarding the preferred alternative for reaches 1 and 2.

### **Response:**

As described under the project area definition on page 32 of the draft EIS, man-made structures in and around the project are barriers to natural littoral drift causing areas of accretion in some sections and erosion in others. The Michigan City Harbor is a barrier to the littoral drift causing areas of erosion in reach 1.

The reaches were grouped because actions to address erosion in reach 1 would affect reach 2; likewise, actions to address erosion in reach 3 would affect reach 4. However, no specific restoration action is required to be taken in reaches 2 and 4 since they are defined as dynamically stable, yet they benefit from the proposed actions in reaches 1 and 3, respectively. The goal of the plan is to develop strategies that would support the reestablishment of more sustainable shoreline sediment movement and a more natural ecosystem of shoreline vegetation, foredune, and dune complexes. The National Park Service cannot control the lake, but can develop strategies to offset erosional forces that are presented as a result of man-made structures in and around the lake. The plan is designed to benefit the entire shoreline rather than specific sites.

## **PROPOSED MODIFICATION TO REACHES 3 AND 4 PREFERRED ALTERNATIVE**

### **Concern Statement:**

One commenter requested additional information on alternative D in reaches 3 and 4, and felt the level of detail for this alternative was insufficient to dismiss it.

### **Response:**

Alternative D for reaches 3 and 4 is still conceptual and engineering design has not been completed; therefore, the exact locations and schematics of the lift stations are not depicted. Alternative D was not eliminated from consideration and was analyzed in detail. However, this alternative was not selected as the preferred alternative because estimated maintenance costs and considerations of jurisdictional authority in combination with the potential environmental benefit ranked this alternative below the selected preferred alternative.

## **CONSULTATION AND COORDINATION – GENERAL COMMENTS**

### **Concern Statement:**

Many commenters expressed the need for cooperation and consultation with partners (municipal, state, and federal as well as private industry) to resolve issues associated with successful shoreline management.

**Response:**

For the plan to be successful there would need to be continued cooperation between all stakeholders in the area. NPS staff will actively coordinate with all parties on an on-going basis and to consult with the various agencies that have permitting and/or regulatory responsibilities. However, despite the fact that each has its own interests and responsibilities, a successful plan to address the shoreline cannot happen without dialogue and interaction among all parties.

**IMPACT ANALYSIS: GENERAL METHODOLOGY FOR ESTABLISHING IMPACTS / EFFECTS**

**Concern Statement:**

A commenter expressed concern that not all relevant projects were considered as part of the cumulative impacts.

**Response:**

The cumulative analysis in the draft EIS lists the projects in the vicinity that the National Park Service is aware of, and includes non-NPS led projects. If there are specific projects provided to the National Park Service that should be included in the cumulative analysis, those will be incorporated in the final EIS.

**IMPACT TOPICS DISMISSED FOR DETAILED ANALYSIS: WATER QUALITY**

**Concern Statement:**

Commenters expressed concern that the preferred alternative in reaches 1 and 2 would have impacts on water quality; especially waterborne pathogens. Similarly there was concern that water quality was dismissed as an impact topic.

**Response:**

The alternatives in this plan have a very low probability of either improving or adversely affecting the water quality of Lake Michigan and was dismissed from further analysis. Nourishment material would be clean and free of contamination. As stated on page 28 in Chapter 1, the permitting conducted prior to dredging, sediment placement, and berm or bypass construction activities would identify mitigation required to protect against human health concerns. In coordination with IDNR, test criteria (which would include algae and bacteria that could potentially be harmful to the public) would be established prior to commencement of nourishment activities.

**ISSUES: CLIMATE CHANGE**

**Concern Statement:**

Several commenters expressed concern that the plan be able to consider and anticipate changes due to climate change.

**Response:**

Climate change is addressed under “Planning Issues and Impact Topics” on page 22 of the draft EIS. As stated in the text, “While it is well accepted that climate change is occurring, the rate and severity of impacts at the park is, as yet, undefined. Extreme weather events have historically been documented in the area of the park, specifically in 1998 and 2010. The anticipated increased frequency and intensity of storm events have the potential to exacerbate the loss of sediment along the shoreline, thereby accelerating the accumulation of sediment on accreting shoreline reaches. These likely future conditions add emphasis to the need for an effective, long-term, beach restoration plan.” The plan has been developed under the assumption that the effects of climate change, including lake levels, would continue to affect the shoreline.

The 100-year storm event was selected as the design condition for the shoreline improvements as a design that could withstand a worst-case scenario. Utilizing the 100-year storm event as a design condition is appropriate given the anticipated increased frequency and intensity of storm events that could exacerbate the loss of sediment along the shoreline as a result of climate change. These likely future conditions add emphasis to the need for an effective, long-term, beach restoration plan.

Beaches are dynamic systems that depend on a constant source of sediment to maintain themselves even when lake levels are going down. Sediment is normally carried by long-shore currents that run parallel to the beach until it is dropped onto sand bars just offshore. In summer, these sandbars are slowly moved beachward by small waves until they reach the shoreline, expanding the beach. In winter, before lake ice forms, large storm waves erode the beach pulling some of the sediment back out into the lake. Even with lower lake levels, nourishment would continue to be required to replenish sediment loss due to storm events.

## **PLAN IMPLEMENTATION AND SIGNAL OF FUTURE INTENT: REMOVAL OF HARDENED STRUCTURES**

**Concern Statement:**

Some commenters requested clarification regarding the existing hardened structures in the project area that could be considered for removal.

**Response:**

The text in Chapter 1 under “Proposed Plan for Implementation” (page 21) has been revised to “Reestablishment of more natural shoreline processes could eventually allow the current structures within the Indiana Dunes National Lakeshore boundaries along the lakeshore to be removed in the future without endangering the adjacent infrastructure.”

Decisions on current structures to be removed would be addressed in the future through more detailed planning efforts. Part of Crescent Dune area is armored with sheet piling. Approximately 650 feet of the seawall at Crescent Dune has recently been acquired by the National Park Service. Changes to management of this area would also need to be considered as part of a more detailed planning effort.



## **PURPOSE AND NEED IS NOT VALID OR SUBSTANTIATED**

### **Concern Statement:**

A few commenters indicated that this plan is not likely to result in a solution, or that it is a solution looking for a problem.

### **Response:**

Unfortunately, not all of the Lake Michigan beach grows larger with lower lake levels. Beaches are dynamic systems that depend on a constant source of sediment to maintain themselves even when lake levels are going down. Sediment is normally carried by long-shore currents that run parallel to the beach until it is dropped onto sand bars just offshore. In summer, these sandbars are slowly moved beachward by small waves until they reach the shoreline expanding the beach. In winter, before lake ice forms, large storm waves erode the beach pulling some of the sediment back out into the lake.

Due to the presence of various industrial and navigational structures along Lake Michigan's southern shore, the transport of sediment along the shoreline has been interrupted. This has resulted in areas of accretion, in which the beach appears to be increasing in size as more sediment becomes trapped, and areas of erosion, in which sediment is carried away from the shoreline and transported downdrift. Since it would not be feasible to remove or modify the harbor, the plan/draft EIS proposes alternatives that would create conditions that more closely mimic natural coastal processes in the presence of the functioning harbors.

As stated in the Summary, "The plan provides the National Park Service with comprehensive guidance for restoring natural shoreline processes, preserving shoreline ecosystems, and providing opportunities for quality visitor experiences at Indiana Dunes National Lakeshore. The intent of the plan/draft EIS is not to provide specific and detailed answers to every issue facing the park, but rather to provide a framework to assist National Park Service managers, stakeholders, and locals governing bodies in making decisions." There is no guarantee that issues with shoreline conditions would be fixed, but with the implementation of this plan, NPS managers would have guidance for addressing these issues.

## **COST OF IMPLEMENTING THE PROJECT IS PROHIBITIVE**

### **Concern Statement:**

The potential benefits of the project are not justified by the cost.

### **Response:**

The NPS is responsible for protecting resources in parks unimpaired for future generations. In addition to protecting park resources this project would benefit other land owners around the park.

## **COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LAW**

### **Concern Statement:**

Commenters asked whether the plan is consistent with the Lake Michigan Coastal Zone Management Act for Indiana.

### **Response:**

The National Park Service reviewed the alternatives presented in the plan and determined the implementation of the alternatives would be consistent with the Coastal Zone Management Act. The National Park Service has worked closely with IDNR during the development of the plan and will continue into the future of the plan. The plan would complement the Lake Michigan Coastal Program for areas that are within NPS jurisdiction.

## **PARK LEGISLATION / AUTHORITY**

### **Concern Statement:**

Some questioned how the plan considered the issues of ownership, authority, and funding in the development of the alternatives.

### **Response:**

The plan has been developed by the National Park Service to provide a framework to assist NPS managers, stakeholders, and local governing bodies in making informed decisions. As stated on page 3 of the draft EIS, the USACE is a cooperating agency on the plan/draft EIS and was included in the decision-making. The IDNR was invited to participate as a cooperating agency but declined (see the Introduction on page 3 and Appendix B on page 321 of the draft EIS). The National Park Service has actively engaged the public, stakeholders, and government officials at the federal, state, and local levels throughout the planning process.

The National Park Service acknowledges that in order for the plan to be effective, full implementation of the plan would have to be a cooperative effort between all stakeholders in the area.

Implementation of the plan is dependent upon available funding. However, development of the plan/draft EIS is the first step toward providing for a comprehensive guidance for restoring natural shoreline processes, preserving the shoreline ecosystem, and providing opportunities for quality visitor experiences at Indiana Dunes National Lakeshore.

## **PARK OPERATIONS: EFFECTS OF PROPOSAL AND ALTERNATIVES**

### **Concern Statement:**

The draft EIS states that impacts to park operations as a result of alternative D would result in minor to moderate, short- to long-term impacts. The U.S. Environmental Protection Agency (USEPA) recommends additional information on the required staff resources, expected maintenance, timing, and costs in relation to the sand bypass system, particularly how these impacts differ from the other alternatives to be included in the final EIS.



The USEPA requested additional information about the sand bypass system.

**Response:**

As stated in Chapter 4 on page 226 of the draft EIS, “following construction, the permanent bypass system would require monitoring and routine maintenance, adding to existing park staff workloads, resulting in minor to moderate, long-term, adverse impacts on park operations.” The estimated cost would be \$35.4 million (see Table 2-2A in Chapter 2 on page 58). In the event alternative D is chosen as the preferred alternative for reaches 1 and 2, timing of construction would be contingent upon available funding.

As noted on page 38 of the draft EIS, detailed design and compliance efforts would be necessary prior to implementation of any of the alternatives involving construction.

**THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN: IMPACT OF PROPOSAL AND ALTERNATIVES**

**Concern Statement:**

One commenter asked whether the plan would impact piping plover habitat.

**Response:**

A summary of impacts on the piping plover habitat is provided in Chapter 4 under “Threatened and Endangered Species and Species of Concern” and is also summarized in Table 2-3, Alternatives Impacts Table, Reaches 1 and 2, and Table 2-4, Alternatives Impacts Table, Reaches 3 and 4. For all proposed alternatives, implementation of the proposed actions may affect, but is not likely to adversely affect, piping plover and their associated habitat.

As stated in Chapter 5, Consultation and Coordination, on page 243, the National Park Service contacted the U.S. Fish and Wildlife Service (FWS) in a letter dated July 2011. The letter advised the FWS of the National Park Service planning process for this plan/draft EIS and requested concurrence with a determination that the proposed project may affect, but is not likely to adversely affect endangered, threatened, and candidate species nor adversely modify piping plover critical habitat.

The FWS responded to the National Park Service’s request in a letter dated August 8, 2011, and concurred with the National Park Service determination for special status species and critical habitat found within the proposed project area (which encompasses the shoreline of Lake Michigan between Michigan City in LaPorte County on the east, and the U.S. Steel breakwater in Gary in Lake County on the west). The Porter County shoreline of Lake Michigan is also included in the project area.

## **TERRESTRIAL HABITAT: IMPACT OF PROPOSAL AND ALTERNATIVES**

### **Concern Statement:**

Concerns were expressed about the placement of nourishment materials within the project area and the impact on terrestrial species; especially migratory shorebirds and state listed plants. It was suggested that placement of materials should be timed to minimize impacts on plants.

### **Response:**

Activities associated with implementation of the plan, including nourishment, would be conducted in coordination with National Park Service wildlife biologists, and timed to reduce the impact to terrestrial species to the extent possible. Potential impacts to migratory shorebird habitat are not anticipated; however, further study would be conducted if warranted.

## **TERRESTRIAL MANAGEMENT PROPOSED ACTIONS**

### **Concern Statement:**

A number of comments were received related to the management of terrestrial resources in the project area including mitigation measures. A commenter requested a definition of the term “social trails” and which trails would be closed. Another commenter inquired how the NPS would ensure that contractors are following guidelines to prevent the spread of invasive plant species during implementation of the plan and how mitigation measures for topsoil would be used to prevent the spread of invasive plant species.

### **Response:**

The specific social trails (paths created as a consequence of foot traffic, or the results of unplanned and undirected regular foot traffic) to be reduced have not been specifically identified. NPS management and resource staff would evaluate social trails on a case-by-case basis and identify those that are accelerating erosion and habitat degradation.

NPS staff would monitor contracts to ensure compliance with guidelines outlined within the plan. Terrestrial management guidelines within the draft EIS are specific to areas within the Indiana Dunes National Lakeshore boundaries.

The disturbed terrestrial environment from beach nourishment is primarily the shoreline/Beach. This area is predominantly sandy and has no organic layer (topsoil) and as such is not conducive to spreading invasive plant species as they will not sprout on the nutrient poor sand.





As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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**Indiana Dunes National Lakeshore**  
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